

REMARKS

The present application is directed to a unique new insulation displacement electrical plug assembly, and particularly to electrical terminals with a unique new combination crimp flange/piercing knife design, as detailed below in response to the pending rejections.

Claims 1-20 were pending in the application at the time of the November 14, 2000 office action. Claims 1-6, 8-11, 13, 15-16 and 18-20 are here amended, claim 21 added, and claim 14 canceled, leaving claims 1-13 and 15-21 in the case.

The examiner objected to the drawings because the length "L" is not outside of the body of the housing and the center line of the plug housing is not labeled. Proposed changes to the drawings, including a change to address this objection, are indicated in red on the attached copy of Figures 4 and 7. It is requested the examiner review and approve these changes. If approved, this change will be entered in the final version of the figures and submitted to the Patent and Trademark Office at the appropriate time.

The examiner has also objected to the specification because the reference character "L" is used to designate both a length and a longitudinal center line. Along with the changes to the figures discussed above, the specification and Figures 4 and 7 have been amended to identify the longitudinal center line as "LL", thereby meeting this objection. If approved, this change will be entered in the final version of the figures and submitted to the Patent and Trademark Office at the appropriate time.

Claims 3, 11, and 16 have been rejected under 35 U.S.C. §112 as being indefinite in reciting the piercing knives to be "in an end-to-end tandem alignment". These claims have been amended to meet this objection.

Claims 1-3 were rejected under 35 U.S.C. §103(a) as being unpatentable over Govaerts (BE 0544048) in view of Bellinger (U.S. Patent No. 5,567,187). The examiner argues that Govaerts discloses a crimp flange with upwardly flared side portions, insulating piercing knives aligned and connected to the crimp flange, and a terminal connected to the crimp flange. Applicants respectfully traverse this rejection.

Rejected independent claim 1, as amended, calls for an electrical terminal comprising an integral crimp flange and insulation piercing knife projecting from the bottom of the flange.

The teaching of Goevarts is deficient in at least two important ways: 1) it does not involve a crimp flange; and 2) the piercing pins are embedded in the body of the plug housing, and are not integral with the terminal. Indeed, Govaerts' piercing pins do not enter the picture until the terminal is positioned in the receptacle. Secondly, element 11 of the Govaerts device is not a crimp flange since it is structured to receive an abutting surface 13 which apparently presses the wire down between the arms of this element spreading it out (rather than crimping it closed) and impaling the wire on the pins. Bellinger does not remedy these shortcomings in the teaching of Govaerts.

First, Bellinger describes an insulation grip blade in which a portion of the insulation of the insulated wire must first be removed in order to establish electrical contact with one of two pairs of flange arms (52). The two pairs of flange arms

together – when crimped – grip the wire but do not cooperate in or include any means for piercing the wire insulation. There is no need of the crimping of Bellinger in the Govaerts device and there is no need of the pointed pins/abutting surface of Govaerts in the device of Bellinger. The combination proposed by the examiner is therefore *inappropos* and does not render claims 1-3 obvious. Furthermore, since pointed pins 8 of Govaerts are embedded in the outer plug material and are not integral with or formed from any portion of the electrical terminal, this combination fails to teach or suggest the cut out knives of claim 2 or the tandem alignment of the cut out knives in claim 3.

Finally, these references do not remotely teach or suggest placement of an insulation-piercing knife in the arcuate shaped bottom of a crimp flange, as required in original claim 1 and now required in new claim 21. This enables the crimping of the side portions 34 of the flange to simultaneously grip the wire, drive the knife through the insulation to establish electrical contact, and crimp the material surrounding the wire insulation to produce a gas tight fit as best seen in Figure 11 and described in the specification.

Claims 5-11 were rejected under 35 U.S.C. §103 as being unpatentable over Bellinger in view of Govaerts. The examiner argues that Bellinger discloses a plug housing with outward ends and spaced apart channels, a pair of insulated conductors, and a pair of electrical terminals including a crimp flange and a blade connected to the crimp flange. The examiner acknowledges that Bellinger fails to disclose insulation piercing knives, but argues that it would be obvious to supply this teaching from

Govaerts. The examiner also argues with regard to claims 6 and 7 that Bellinger shows the housing and the electrical terminal with a one-piece construction, with regard to claims 8 and 9 that Bellinger shows the structure in Figure 2, and with regard to claims 10 and 11 that Govaerts shows a pair of insulating piercing knives disposed in tandem and in alignment.

These rejections parallel those already advanced against claims 1 to 3. Claim 5, the sole rejected independent claim, is directed to a plug assembly using the electrical terminal of claim 1. This terminal is neither taught nor suggested by Bellinger in view of Govaerts for the reasons advanced above with regard to the rejection of claim 1 over these references. The remaining dependent claims are believed to be patentable over these references based on the patentability of claim 5.

Claims 4 and 12 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Bellinger and Govaerts as applied to claims 1 and 5, and further in view of Takemasa (U.S. Patent No. 6,045,408). These claims are believed to be patentable over these references on the basis of the above noted patentability of the independent claims from which they depend, nos. 1 and 5.

Claims 13 and 18-20 have been rejected under 35 U.S.C. §103(a) as being obvious over Govaerts (U.S. Patent No. 2,229,288) in view of Ozaki (Japanese Patent No. 09-213436). The examiner acknowledges that Govaerts does not provide a procedure for making a plug assembly, but argues that the structure shown in Govaerts suggests the method claimed except for the provision of a strip to align the terminals (steps A and D). The examiner then argues that Ozaki discloses the use of a strip to

align the terminals and that it therefore would have been obvious to use such a strip to align and hold the terminals to accelerate the manufacture of the assembly.

Applicant respectfully traverses this rejection on the basis of the amendments to independent claim 13 which incorporate the unique structural features of the terminals which make the claimed method patentable.

Claim 14 (now incorporated into claim 13) has been rejected under 35 U.S.C. §103(a) as being unpatentable over Govaerts and Ozaki as applied to claim 13 and further in view of Weimer (Belgian Patent No. 0622734). The examiner argues that Weimer supplies the piercing knives being cut out and bent upwardly which is missing from these references.

Weimer is directed to a device for attaching a wire to bare, conductive sheet material (20). The separate contact (24) does not have piercing knives. The independent portion of the device which is to be attached to the sheet material may pierce the sheet material, but the piercing portion (18) is nowhere in the vicinity of the crimp flange, let alone integral with it.

Claim 15 and 16 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Govaerts, Ozaki and Weimer as applied to claim 14 and further in view of Govaerts. The examiner argues in support of this rejection that Govaerts teaches the use of a plurality of piercing knives provided in tandem alignment. These dependent claims are believed to be patentable based on the patentability of independent claim 13, from which they depend.

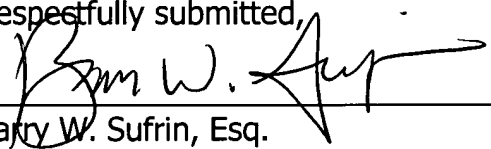
Claim 17 has been rejected under 35 U.S.C. §103(a) as being obvious over Govaerts, Ozaki and Weimer as applied to claim 14 and further in view of Takemasa. The examiner argues in support of this rejection that Takemasa teaches the use of undulations on a web portion, and that it would have been obvious from the Takemasa teaching to provide undulations on opposite sides of the web portion. The examiner argues in support of this position that duplication of essential working parts involves only routine skill in the art, citing *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. This dependent claim is believed to be patentable based on the patentability of independent claim 13, from which it depends.

If the examiner again rejects these claims, he is requested to call applicants' attorney before issuing the rejection so that the patentable nature of the invention may be further discussed. If necessary, this call may be made collect to (312) 661-2100.

In view of the amendments to the claims and the remarks above, it is respectfully requested that the pending rejections be withdrawn and that all claims in the case be allowed.

Date: 12/7/01

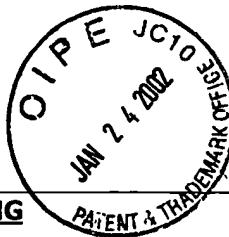
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EXHIBIT A: AMENDED CLAIMS

1. (Amended.) An electrical terminal, comprising:

(a) a crimp flange having a pair of upwardly directed [and outwardly flared] opposite side portions and [an arcuate-shaped] a bottom portion extending between and interconnecting said side portions;

(b) at least one insulation piercing knife integral with said crimp flange [connected to said crimp flange and being cutout and bent] projecting [upwardly] from said bottom portion into the space between said side portions [and disposed interiorly of said side portions thereof such that an end of an insulated conductor can be placed between said side portions of said crimp flange and over said piercing knife and said crimp flange crimped onto the insulated conductor end by bending said side portions of said crimp flange toward one another over and downwardly toward the insulated conductor end whereupon said side portions of said crimp flange press the insulated conductor end downwardly upon said piercing knife which pierces and displaces insulation of the insulated conductor end and makes a substantially gas-tight electrical connection with an electrical wire within the insulated conductor]; and

(c) a blade [connected to] extending from said crimp flange [and extending therefrom] for insertion into an [external] electrical socket [for making an electrical connection with a contact thereof].

2. (Amended.) The terminal of Claim 1 wherein said at least one insulation piercing knife is a pair of insulation piercing knives [cutout] cut out and bent upwardly from said

bottom portion of said crimp flange [and disposed interiorly of said side portions thereof].

3. (Amended.) The terminal of Claim 2 wherein said insulation piercing knives are disposed substantially in [an end-to-end] a tandem alignment with one another.

4. (Amended.) The terminal of Claim 1 wherein said blade includes a web portion connected to said crimp flange and [having] a plurality of abutting undulations formed along opposite sides of said web portion [so as to define] defining [lance-formed] barbs [which are capable] for abutting against a plug housing without flexing thereby [and preventing] to resist removal of said electrical terminal therefrom.

5. (Amended.) An electrical plug assembly, comprising:

(a) a plug housing having opposite ends and defining a pair of spaced apart channels therethrough open at each of said opposite ends thereof;

(b) a pair "of insulated conductors each having an end and an electrical wire and a layer of insulation covering said wire and being disposed at least partially within one of said channels of said plug housing; and

(c) a pair of electrical terminals each being insertable into one of said channels of said plug housing at one of said opposite ends of said plug housing, each said terminal including:

(i) a crimp flange having a pair of upwardly directed [and outwardly flared] opposite side portions and [an] a concave arcuate-shaped bottom portion extending between and interconnecting said side portions;

(ii) at least one insulation piercing knife integral with said crimp flange [connected to said crimp flange and being cutout and bent] projecting upwardly from said bottom portion into the space between said side portions [and disposed interiorly of said side portions thereof such that an end of an insulated conductor can be placed between said side portions of said crimp flange and over said piercing knife and said crimp flange crimped onto the insulated conductor end by bending said side portions of said crimp flange toward one another over and downwardly toward the insulated conductor end whereupon said side portions of said crimp flange press the insulated conductor end downwardly upon said piercing knife which pierces and displaces insulation of the insulated conductor end and makes a substantially gas-tight electrical connection with an electrical wire within the insulated conductor]; and

(iii) a blade [connected to] extending from said crimp flange [and extending therefrom] for insertion into an external electrical socket for making an electrical connection [with a contact thereof].

6. (Amended.) The assembly of Claim 5 wherein said housing [has] is of a one-piece construction.

8. (Amended.) The assembly of Claim 5 wherein:

each of said electrical terminals [terminal] has opposite ends; and

said crimp flange of each said electrical terminal is disposed at a rearward position on said electrical terminal adjacent to one of said opposite ends thereof.

9. (Amended.) The assembly of Claim 8 wherein said blade of each of said electrical terminals [terminal] is disposed at a forward position on said electrical

terminal opposite from said crimp flange and adjacent to the other of said opposite ends of said electrical terminal and extending therefrom toward but spaced from said one opposite end of said electrical terminal.

10. (Amended.) The assembly of Claim 5 wherein said at least one insulation piercing knife of said electrical terminal is a pair of insulation piercing knives [cutout] cut out and bent upwardly from said bottom portion of said crimp flange of said electrical terminal and disposed [interiorly of] between said side portions of said crimp flange of said electrical terminal.

11. (Amended.) The terminal of Claim 10 wherein said insulation piercing knives are disposed substantially in [an end-to-end] a tandem alignment with one another.

13. A method of making a plug assembly, said method comprising the steps of:

(a) providing a plug housing and a plurality of electrical terminals [on a strip], each of the electrical terminals having a crimp flange, at least one insulation piercing knife connected to the crimp flange and a blade connected to the crimp flange for insertion into an external electrical socket, the crimp flange having a pair of upwardly directed opposite side portions and a bottom portion extending between and interconnecting the side portions, the knife extending upwardly from the bottom portion of the crimp flange and disposed between the side portions of the crimp flange such that the end of the insulated conductor can be placed between the side portions of the crimp flange and over the piercing knife whereupon prior to insertion of the electrical terminal into the respective one of the channels of the plug housing the crimp flange is crimped onto the insulated conductor end by bending the side portions of the crimp

flange toward one another over and downwardly toward the insulated conductor end such that the side portions of the crimp flange press the insulated conductor end downwardly upon the piercing knife which pierces and displaces insulation of the insulated conductor end and makes an electrical connection with an electrical wire of the insulated conductor and such that after crimping the crimp flange the electrical terminal may be inserted into the channel of the plug housing at the one of opposite ends of the plug housing to a point spaced interiorly from the other of the opposite ends of the plug housing;

(b) passing a pair of insulated conductors through channels of [at least one] the plug housing such that separate portions of each of the insulated conductors extend from opposite ends of the plug housing;

(c) aligning ends of the electrical terminals with the portions of the insulated conductors which extend from one of the opposite ends of the plug housing;

[(d) removing the strip interconnecting the electrical terminals;

(e)] (d) crimping the electrical terminals on the ends of the insulated conductors such that insulation on the insulated conductors is penetrated and electrical connections are made between the electrical terminals and electrical wires within the ends of the insulated conductors; and

[(f)] (e) securing the crimped electrical terminals on the insulated conductor ends within the channels of the plug housing.

15. (Amended.) The method of Claim 14 wherein said electrical terminal is provided with a pair of insulation piercing knives cutout and bent upwardly from the bottom

portion of the crimp flange [and disposed anteriorly of the side portions of the crimp flange of the electrical terminal].

16. (Amended.) The method of Claim 15 wherein said insulation piercing knives are provided substantially in [an end-to-end] a tandem alignment with one another.

18. (Amended.) The method of Claim 13 wherein the terminals are provided with an interconnecting strip and [said removing] the strip is removed [occurs] concurrently with [said] the crimping of the electrical terminals.

19. (Amended.) The method of Claim 13 wherein the terminals are provided with an interconnecting strip and [said removing] the strip is removed after [said] the crimping of the electrical terminals.

20. (Amended.) The method of Claim 13 wherein the terminals are provided with an interconnecting strip and [said removing] the strip is removed before [said] the crimping of the electrical terminals.